



Tissue carbon, nitrogen, and sulfur stable isotope turnover in transplanted *Bathymodiolus childressi* mussels: Relation to growth and physiological condition

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ABSTRACT: The growth and physiological condition of the methanotrophic hydrocarbon seep mussel *Bathymodiolus childressi* reflects the habitat quality of the sites it occupies on the seafloor of the upper Louisiana slope of the Gulf of Mexico. Here, tissue stable isotope compositions, growth, and physiological health of *B. childressi* mussels transplanted between different seep sites changed within a year to reflect conditions at the new environment. Tissue stable carbon and nitrogen isotope turnovers, although substantial, were not complete at the end of the 1-yr transplant period; they were strongly correlated with each other, and the extent of turnover of both varied by site and was related to the growth of the mussels. Carbon and nitrogen isotopic turnovers caused by metabolic tissue turnover were about 35% per year. This slow isotopic turnover in *B. childressi* is presumably due to its relatively slow growth and low metabolic rate. On the other hand, tissue stable sulfur isotope turnover was not correlated with either stable carbon or nitrogen isotope turnover or growth and was higher in the site with higher levels of sulfide in the environment. This indicated that tissue stable sulfur isotope turnover in these mussels is influenced by sulfide detoxification activities.

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